

**A review of the endemic Australian chiton genus  
*Bassethullia* Pilsbry 1928  
(Mollusca: Polyplacophora: Acanthochitonidae).**

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**ABSTRACT**

The endemic Australian genus *Bassethullia*, previously considered a subgenus of *Notoplax*, is elevated to full generic rank and redefined. The Tertiary and Recent species of *Bassethullia* are reviewed and redescribed, and their distributions and the habitats of the living species are given. A key to the species is presented. Five species are recognised, three living and two extinct species, one of which is new. *B. porcina* is recognised as distinct from *B. matthewsi*.

**INTRODUCTION**

The genus *Bassethullia* was erected by Pilsbry (1928) to replace the preoccupied generic name *Glyptelasma* Iredale & Hull, 1925. This genus is endemic to southern Australia, and is represented by several poorly known Tertiary and Recent species. This group was given full generic rank by Iredale and Hull (1925, 1927), Cotton and Weeding (1939), Cotton and Godfrey (1940a, 1940b), Cotton (1953, 1964) and Macpherson and Gabriel (1962), but, along with *Notoplax* H. Adams, 1861, was regarded as a synonym of *Craspedochiton* Shuttleworth, 1853 by Smith (1960). Van Belle (1978) separated *Notoplax* from *Craspedochiton*, but placed *Bassethullia* as a subgenus of the former, which was followed by Kaas and Van Belle (1980) and Van Belle (1983).

Here, the genus *Bassethullia* is re-evaluated and redefined, based on detailed examinations of its members. These species are reviewed and redefined, their taxonomy clarified, and their distributions and the habitats of the living species are defined.

**MATERIALS AND METHODS**

All available material from the Australian Museum, Sydney (AM), Museum of Victoria, Melbourne (MV), Queensland Museum, Brisbane (QM), South Australian Museum, Adelaide (SAM), Tasmanian Museum and Art Gallery, Hobart (TM), Western Australian Museum, Perth (WAM), the Academy of Natural Sciences, Philadelphia (ANSP) and the National Museum of New Zealand, Wellington (NMNZ) has been examined. Radulae were prepared for examination under the scanning electron microscope (SEM) after the method of

Bandel (1984). Species descriptions are based on the types and any other available material. Colour descriptions follow Kornerup and Wanscher (1978). Species are listed alphabetically.

**Family Acanthochitonidae Pilsbry, 1893**

**Genus *Bassethullia* Pilsbry, 1928**

*Glyptelasma* Iredale & Hull, 1925, p. 94. Type-species: *Acanthochites matthewsi* Bednall & Pilsbry, 1894, by original designation (non Pilsbry, 1907, Crustacea).

*Bassethullia* Pilsbry, 1928, p. 105. Type-species: *Acanthochites matthewsi* Bednall & Pilsbry, 1894, by original designation (nom. nov. pro *Glyptelasma* Iredale & Hull, preoccupied).

*Lirachiton* Ashby & Cotton, 1939, p. 215. Type-species: *Acanthochiton (Lirachiton) inexpectus* Ashby & Cotton, 1939, by original designation.

*Molachiton* Ashby & Cotton, 1939, p. 220. Type-species: *Molachiton naxus* Ashby & Cotton, 1939, by original designation.

**Diagnosis**

Medium to large chitons; tegmentum somewhat reduced; jugum smooth, poorly differentiated; sculpture of lateral and pleural areas usually different, of longitudinal grooves and ridges, sometimes also with pustules; articulamentum large; insertion plates large, slits 1/5 to 2/3 width of articulamentum; slit formula 5/1/4-8 without sinus; girdle microscopically spiculose, always with sutural tufts; gills merobranchial; radula with rectangular central teeth, broad, thickened first lateral teeth and major lateral teeth with tricuspidate heads.

**Remarks**

This group is given full generic rank here. Van Belle (1978, 1983) and Kaas and Van Belle (1980) regarded this genus as a subgenus of *Notoplax*, but it differs consistently from *Notoplax* in several important characteristics. The lateral and pleural areas in *Bassethullia* are distinguishable and their sculpture differs, whereas in *Notoplax* these areas, even if they are distinguishable, have the same sculpture. Also, the sculpture of the lateral and pleural areas in *Bassethullia* includes longitudinal grooves and ridges, a feature not found in *Notoplax*, nor recorded for the sculpture of these areas in any other group in the Acanthochitonidae. The insertion plate slits in *Bassethullia* are better developed than those found in *Notoplax* and always relatively longer. I believe these characters are significant at the generic level and warrant the recognition of *Bassethullia* as a full genus in the family Acanthochitonidae.

*Lirachiton* Ashby & Cotton, 1939 and its synonym *Molachiton* Ashby & Cotton, 1939 are included as synonyms of *Bassethullia* following Gowlett-Holmes (1987). *Bassethullia* is endemic to southern Australia.

**Key to the species of the genus *Bassethullia*.**

- 1. Lateral areas smooth ..... *B. glypta*
- Lateral areas sculptured ..... 2
- 2(1). Lateral areas sculptured with grooves only ..... 3
- Lateral areas sculptured with grooves and pustules ..... 4

- 3(2). Posterior valve tegmentum 1.5 times (or less) as long as wide ..... *B. porcina*  
 Posterior valve tegmentum twice as long as wide ..... *B. propeporcina*
- 4(2). Posterior valve with jugum about 1/4 width, and mucro in posterior 1/4, of tegmentum ..... *B. matthewsi*  
 Posterior valve with jugum about 1/3 width, and mucro in posterior 1/3, of tegmentum ..... *B. inexpecta*

***Bassethullia glypta* (Sykes, 1896)**

Figs 1, 2.

*Acanthochites (Notoplax) glyptus* Sykes, 1896, p. 92, pl. 6, figs 5, 5a; Thiele, 1910, p. 71.

*Acanthochiton (Notoplax) glyptus* (Sykes): Ashby, 1918, p. 85; Ashby, 1921, p. 152.

*Acanthochiton glyptus* (Sykes): Ashby, 1924, pp. 382, 390.

*Glyptelasma glypta* (Sykes): Iredale & Hull, 1925, p. 95, pl. 11, fig. 23; Iredale & Hull, 1927, p. 85, pl. 10, fig. 23.

*Notoplax glyptus* (sic) (Sykes): Ashby, 1927, p. 98.

*Bassethullia glypta* (Sykes): Cotton & Weeding, 1939, p. 198; Cotton & Godfrey, 1940a, p. 536, fig. 536; Cotton & Godfrey, 1940b, p. 25; Macpherson & Gabriel, 1962, p. 10; Cotton, 1964, p. 81, fig. 90.

*Notoplax (Bassethullia) glypta* (Sykes): Kaas & Van Belle, 1980, p. 54; Burn, 1986a, p. 4; Burn, 1986b, p. 4; Burn, 1987, p. 6.

**Material examined**

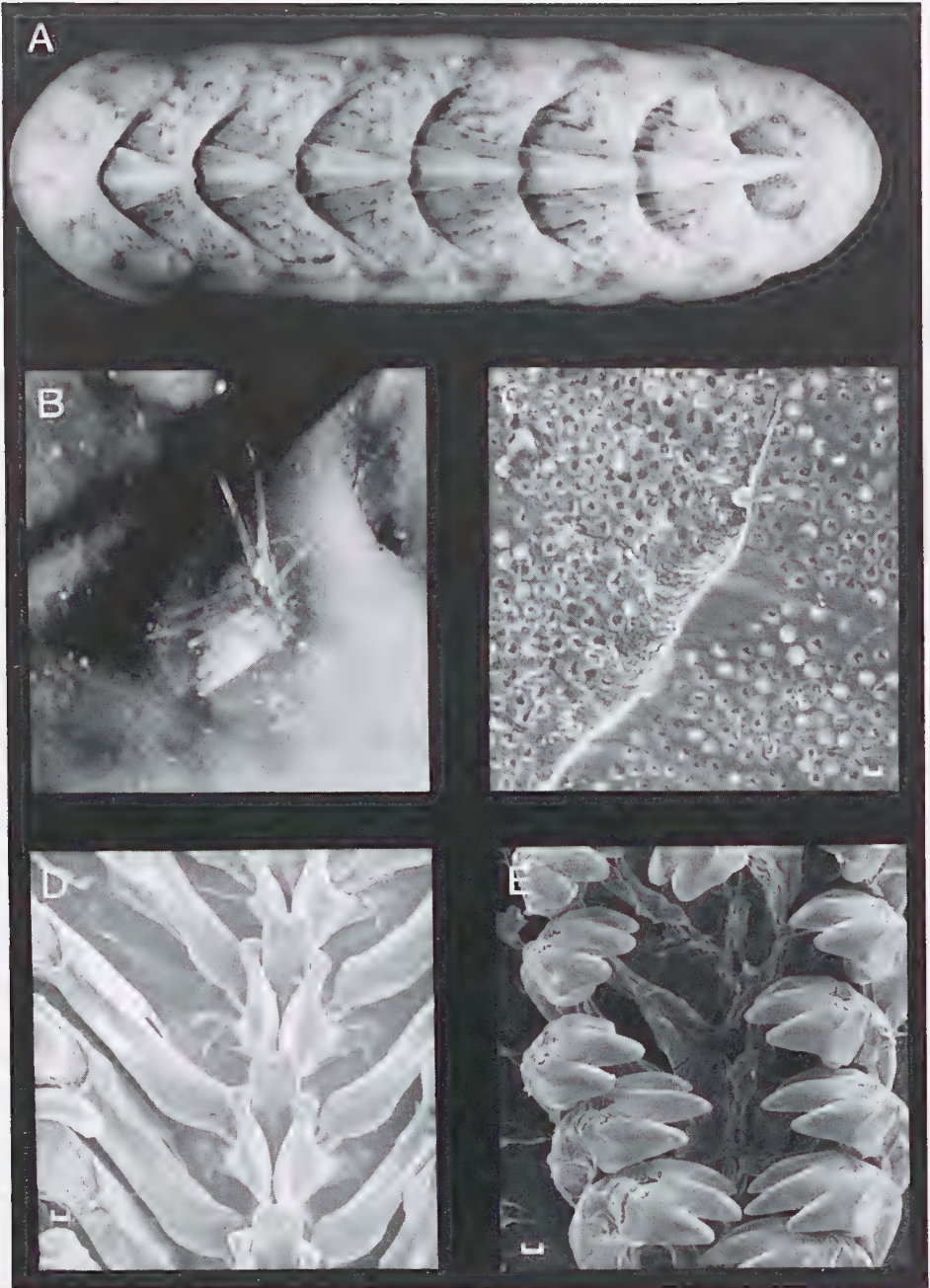
Types: Holotype (MV F680) and paratype (MV F27307) from Port Phillip Bay, Victoria, collected by J.B. Wilson.

Extant material: Victoria: Flinders (2, MV F27296); Sorrento, Port Phillip Bay (1, MV F54346); Portsea, Port Phillip Bay (5, MV F22339, F52976-7; F54347); Bass Strait (1, MV F52975; 1, SAM D18440). Tasmania: no data (2, SAM D10713, D12800).

**Species description**

Large chiton to 60 mm (Fig. 1A). Semi-carinated, medium elevation (Fig. 2D); tegmentum about 75% of articulamentum. Tegmentum with numerous random aesthetes all over except for edges of ridges (Fig. 1C). Tegmentum colour white to pale grey with pale to dark grayish green and light brown flecks and streaks, extent of darker colouring variable; jugum usually white to pale grey. Articulamentum white. Slit formula 5/1/7. Girdle colour yellowish white with grayish green to light brown patches and bands; sutural tufts white.

Anterior valve (Fig. 2A) smooth except for slight irregular growth lines; 5 very weak radial ribs. Slits 5, 1/3 width of insertion plate, in grooves to edge of tegmentum. Median valves (Fig. 2B) with smooth jugum which has the appearance of longitudinal grooves due to alternate bands of translucent and opaque material, beaked, weakly toothed at beak; jugum barely differentiated from pleural areas.



**Figure 1.** *Bassethullia glypta*. A. whole specimen, x 4 (MV F54347); B. detail of girdle showing sutural tuft, x 35 (MV F54347); C. detail of tegmentum showing aesthetes, scale bar = 10  $\mu\text{m}$  (SAM D10713); D. radula showing central and first lateral teeth, scale bar = 10  $\mu\text{m}$  (MV F52975); E. radula showing major lateral teeth, scale bar = 20  $\mu\text{m}$  (SAM D10713).

Lateral areas smooth, separated from pleural areas by very weak diagonal rib; anterior half of pleural areas with few longitudinal grooves, becoming irregular toward outer edge, rest of pleural areas smooth. Slit 1, long,  $2/3$  width of insertion plate, in short groove to edge of tegmentum. Posterior valve (Figs 2C, 2E) with tegmentum as long as wide; jugum smooth, like median valves; antemucronal area like grooved part of pleural areas of median valves; mucro smooth, in posterior  $1/3$  of tegmentum; postmucronal area concave, not steep, smooth. Slits 7,  $1/4$  to  $1/3$  width of insertion plate, in grooves to edge of tegmentum.

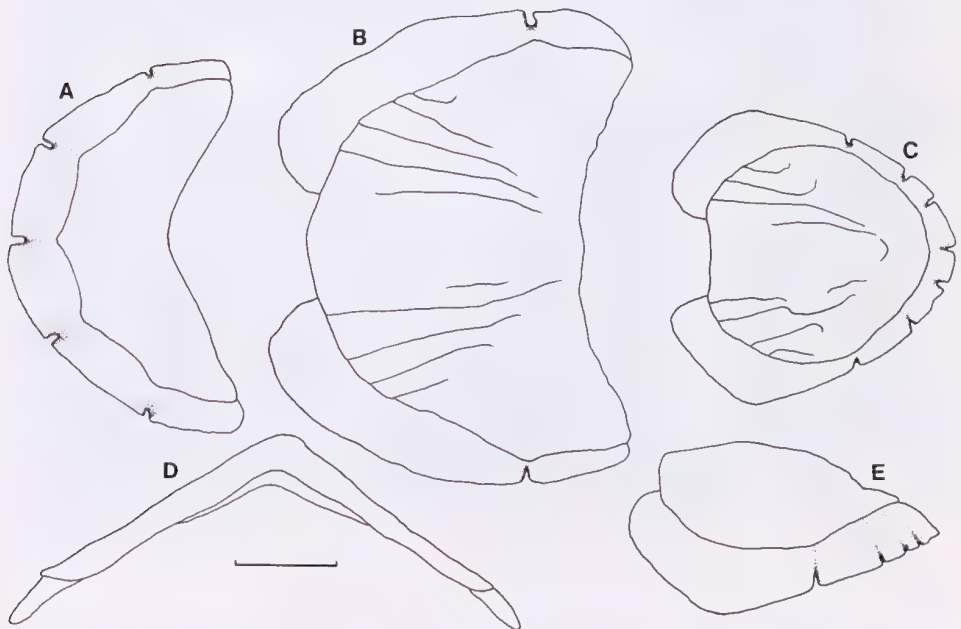
Girdle (Fig. 1B) with numerous microscopic ( $40-80\ \mu\text{m}$  long), tapering, sharp tipped, white to clear spicules. Sutural tufts small, with clear, tapering, sharp tipped spicules,  $350-850\ \mu\text{m}$  long.

Gills numerous, merobranchial, abanal, 24-26 ctenidia on each side, tapering large to small anteriorly.

Radula (Figs. 1D, 1E) with small, elongate, rectangular, concave central teeth, apical edge of head slightly concave; first lateral teeth narrow basally, with broad, rounded heads folded around central teeth, apical edge of head thickened; major lateral teeth narrow basally, with wide tricuspidate heads, central cusp longest.

#### Habitat

On rock, probably under sand, on reefs. Also free-living in sand; intertidal to at least 10 m depth, see remarks below.



**Figure 2.** *Bassethullia glypta* (SAM D10713). A. anterior valve; B. median valve; C. posterior valve; D. median valve (posterior profile); E. posterior valve (lateral profile); scale bar = 2 mm.

## Distribution

Central Victoria to Tasmania. No fossil records are known.

## Remarks

This species has been collected very rarely, and the majority of the specimens collected have no habitat data recorded with them (Burn, 1986b). During the centennial survey (1986/87) of Port Phillip Heads, Victoria by the Marine Research Group of Victoria, three specimens (MV F54346-7) were dredged on algae covered sandstone reefs in 6 to 10 m. Two other specimens (MV F27296) were collected crawling through sand on the ocean beach at Flinders, Victoria, at very low tide level in 1966. This species probably lives on rock or pebbles in sand on reefs, similar to *B. matthewsi* and *B. porcina*, and is capable of free-living in sand, as the above two specimens (MV F27296) demonstrate.

The distribution of *B. glypta* is very restricted, with most having been found in the Port Phillip Bay area of Victoria, two specimens (SAM D18440, MV F52975) from Bass Strait, and two specimens (SAM D10713, D12800) from an unspecified locality in Tasmania. The latter specimens were discussed in detail by Ashby (1927), who indicated that the probable locality for them was Stanley, northern Tasmania. These specimens (SAM D10713, D12800) are the only record of *B. glypta* from Tasmania.

### *Bassethullia inexpecta* (Ashby & Cotton, 1939)

Fig. 3.

*Acanthochiton (Lirachiton) inexpectus* Ashby & Cotton, 1939, p. 215, pl. 20, fig. 31.

*Molachiton naxus* Ashby & Cotton, 1939, p. 220, pl. 20, fig. 32.

*Lirachiton inexpectus* (Ashby & Cotton): Cotton & Godfrey, 1940a, pp. 572, 575, fig. 581; Cotton & Weeding, 1941, p. 443; Cotton, 1964, p. 125, fig. 131; Van Belle, 1981, pp. 43, 53.

*Notoplax (Bassethullia) inexpecta* (Ashby & Cotton): Gowlett-Holmes, 1987, p. 109; Gowlett-Holmes & McHenry, 1988, pp. 4, 5, 9.

## Material examined

Types: Holotype (SAM P4350) (posterior valve) from MacDonaldis, Muddy Creek, Hamilton, Victoria, collected by W. Greed, Grange Burn Formation, Kalimnan, Pliocene. *Molachiton naxus*: Holotype (SAM P4351) (median valve) from MacDonaldis, Muddy Creek, Hamilton, Victoria, collected by W. Greed, Grange Burn Formation, Kalimnan, Pliocene.

Fossil material: Western Australia: Rando's No. 2 Bore, 17.2-17.4 m, Thornlie, Ascot Formation, Pliocene (1 median valve, WAM 88.344).

## Species description

Small to medium chiton. Carinated. Slit formula ?/1?/?. Girdle unknown.

Anterior valve unknown. Median valve (Fig. 3C, 3D) with smooth jugum, edge of jugum irregularly toothed; lateral area sculptured with semicircular to "U"-

shaped pustules in irregular rows, pustules coalescing and rows becoming linear ridges on pleural area. Slits unknown. Posterior valve (Fig. 3A, 3B) tegmentum about as wide as long; jugum smooth, about 1/3 width of tegmentum; antemucronal area with linear ridges becoming pustulose posteriorly. Mucro in posterior 1/3 of tegmentum; postmucronal area slightly concave, not steep, sculptured with irregular, semicircular pustules. Slits unknown.

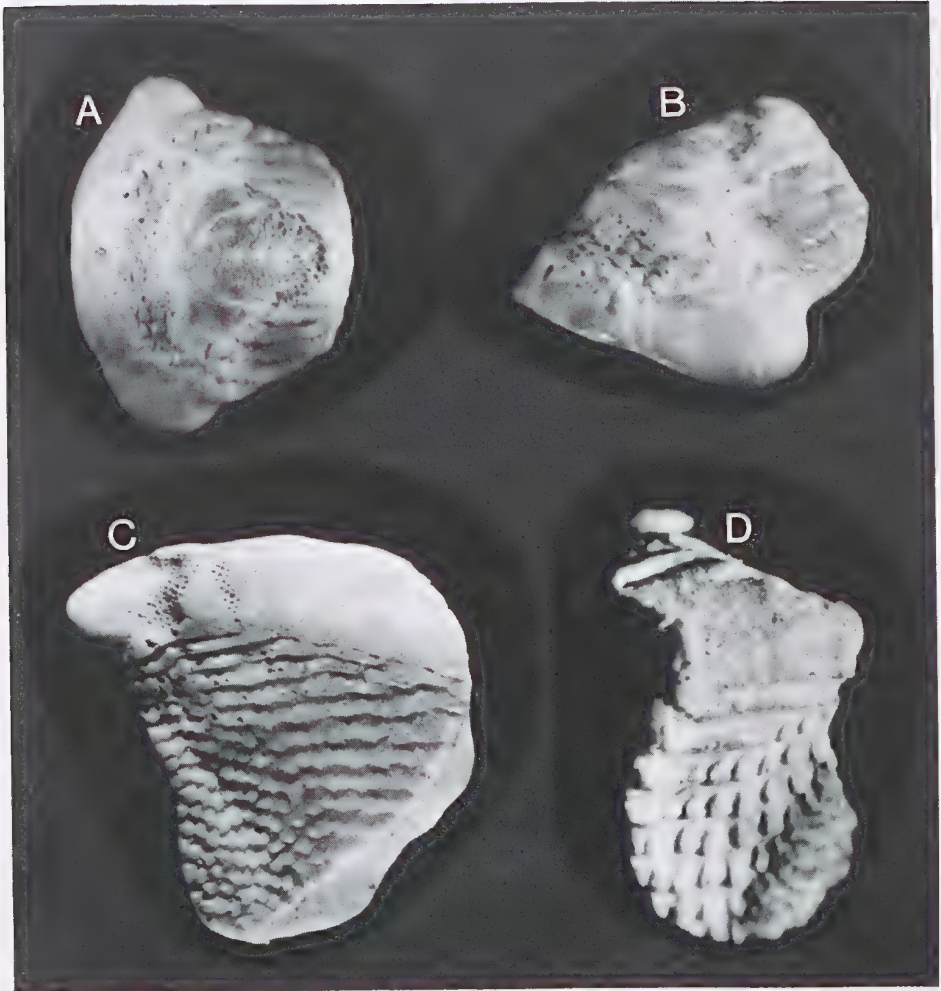


Figure 3. *Bassethullia inexpecta*. A. holotype, dorsal view, x 19 (SAM P4350); B. holotype, lateral view, x 23 (SAM D4350); C. holotype (*Molachiton naxus*), x 14 (SAM P4351); D. median valve fragment, x 27 (WAM 88.344).

### Distribution

Western Victoria and southern Western Australia. Pliocene.

**Remarks**

The specimen from Western Australia (WAM 88.344) is the first record of this species from that state, and is the only specimen known other than the types. All the known material is very worn and broken, so the species description is incomplete. This species closely resembles the extant species *B. matthewsi*, but its exact relationship to the latter can only be determined when specimens in a better state of preservation are found.

***Bassethullia matthewsi* (Bednall & Pilsbry, 1894)**

Figs 4, 5.

*Acanthochites matthewsi* Bednall & Pilsbry in Pilsbry, 1894a, p. 120.

*Acanthochites (Notoplax) matthewsi* Bednall & Pilsbry: Pilsbry, 1894b, p. 83, pl. 4, figs 27-30; Sykes, 1896, p. 91; Thiele, 1910, p. 72; Torr, 1912, p. 160.

*Acanthochiton (Notoplax) matthewsi* (Bednall & Pilsbry): Ashby, 1921, p. 152.

*Acanthochiton matthewsi* (Bednall & Pilsbry): Ashby, 1924, pp. 382, 385, 390.

*Glyptelasma matthewsi matthewsi* (Bednall & Pilsbry): Iredale & Hull, 1925, p. 94, pl. 11, figs 17, 19, 21, 22; Iredale & Hull, 1927, p. 84, pl. 10, figs 17, 19, 21, 22.

*Glyptelasma matthewsi occidentalis* Iredale & Hull, 1925, p. 95, pl. 11, figs 18, 20; Iredale & Hull, 1927, p. 85, pl. 10, figs 18, 20.

*Notoplax matthewsi* (Bednall & Pilsbry): Ashby, 1928, p. 175.

*Bassethullia matthewsi* (Bednall & Pilsbry): Cotton & Weeding, 1939, p. 198; Cotton & Godfrey, 1940a, p. 536, fig. 534; Cotton & Godfrey, 1940b, p. 25; Macpherson & Gabriel, 1962, p. 9, fig. 16; Cotton, 1964, p. 80, fig. 88.

*Bassethullia matthewsi occidentalis* (Iredale & Hull): Cotton & Godfrey, 1940b, pp. 25; Cotton, 1964, p. 80.

*Notoplax (Bassethullia) matthewsi* (Bednall & Pilsbry): Kaas & Van Belle, 1980, p. 82, 103; Zeidler & Gowlett, 1986, p. 98.

*Notoplax (Bassethullia) matthewsi occidentalis* (Iredale & Hull): Kaas & Van Belle, 1980, pp. 82, 92.

**Material examined**

Types: Holotype (ANSP 64916) from Giles Point, Yorke Peninsula, South Australia, collected by E.H. Matthews. *Glyptelasma matthewsi occidentalis*: Holotype (WAM 11660) and paratype (MV F15164) from under a stone at low water, Middleton Beach, King George Sound, Western Australia, collected by A.F.B. Hull.

Extant material: Victoria: no data (1, MV F57629) Walkerville (1, MV F52983); Cape Paterson (1, MV F52984); Shoreham, Westernport Bay (1, MV F52968); Balnarring, Westernport Bay (1, MV F52969); Torquay (1, MV F23501); Moonlight Head (1, MV F52981). South Australia: no data (7, SAM D12231, D12560, D17556; 2, AM C5583, C155652; 2, MV F52970, F52974; 1, ANSP 92185); Beachport (1, SAM D17557); Robe (2, MV F52972, F57624); Cape Jaffa (4, SAM D18447); Vivonne Bay, Kangaroo Island (8, SAM D18446); Gulf St Vincent (2, AM C16952); Normanville, Gulf St Vincent (1, SAM D12238); Port



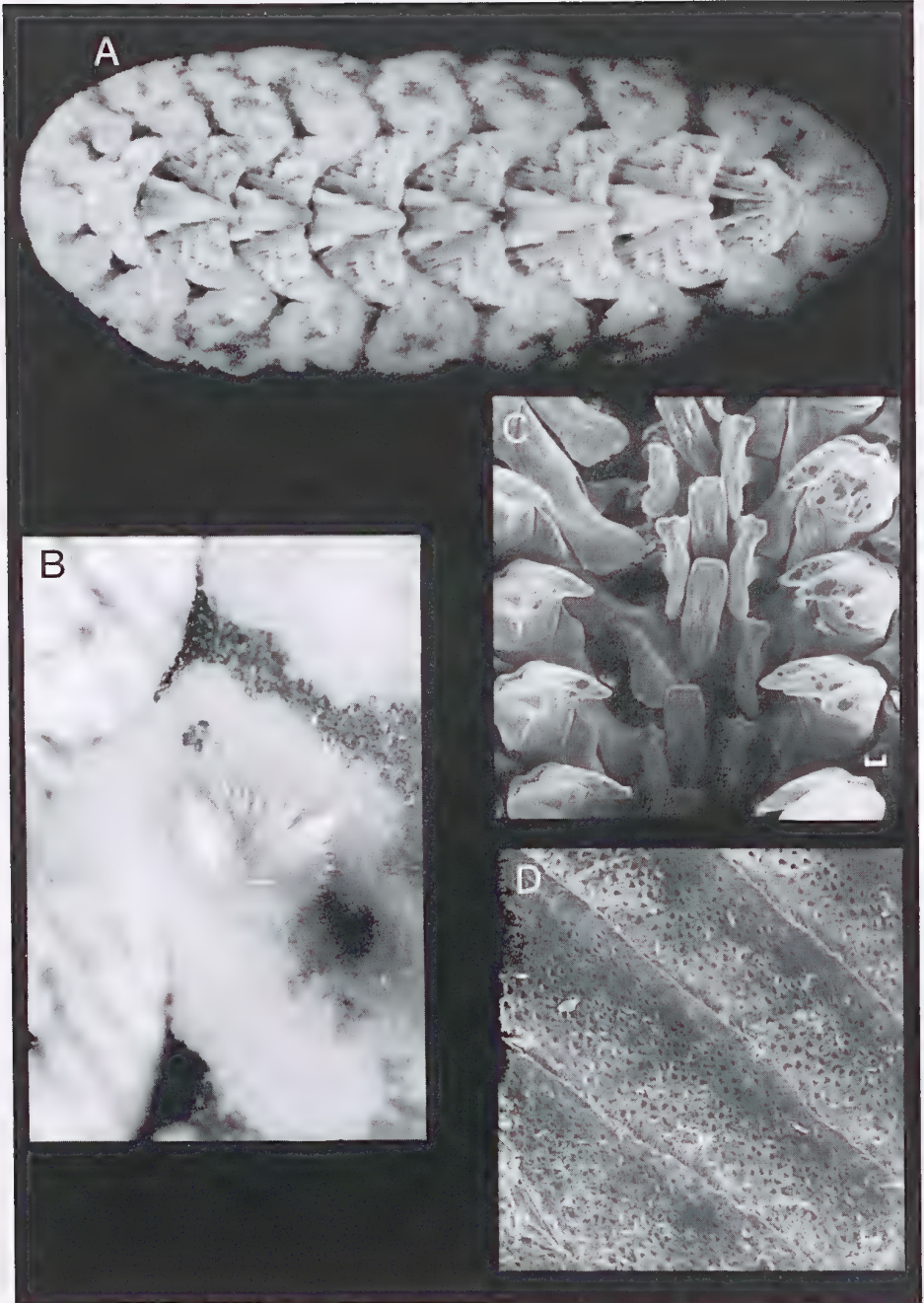
Willunga, Gulf St Vincent (1, SAM D17558); Wittons Bluff, Gulf St Vincent (2, SAM D17567); Marino, Adelaide (37, SAM D12230, D17559-66, D17387; 2, AM C5464; 11, MV F19266, F21601, F52971, F57623, F57626, F57628); Giles Point, Yorke Peninsula (1, AM C155653); Edithburgh, Yorke Peninsula (6, SAM D12657, D17568, D17588, D17603; 1, AM C10411; 2, MV F52973; 1, NMNZ MF.16852); Sultana Bay, Yorke Peninsula (1, SAM D13741); Troubridge Point, Yorke Peninsula (2, SAM D18445); Kemp Bay, Yorke Peninsula (2, SAM D18416); Port Moorowie, Yorke Peninsula (11, SAM D17604, D18444); Point Yorke, Yorke Peninsula (3, SAM D17569, D17979); Chinamans Hat Island, Yorke Peninsula (1, SAM D17571); Daly Head, Yorke Peninsula (1, SAM D17570); Corny Point, Yorke Peninsula (4, SAM D12239, D17572-3); Port Hughes, Yorke Peninsula (2, SAM D12876; 2, MV 57622); Arno Bay, Eyre Peninsula (3, SAM D17574; 2, MV F57625); Franklin Islands (12, SAM D16692-5). Western Australia: Cape Riche (1, AM C155661); Augusta (1, AM C155660); Ellenbrook Beach (1, AM C155659); Margaret River (3, AM C148293; 1, MV F52985); Cottesloe (2, SAM D17575; 8, WAM 15607/11, 1598 3/8/5); Yanchep (2, AM C148279, C155658).

Fossil material: Western Australia: Paulik's Bore, 28.1-34.3 m, Jandakot, (Jandakot beds), Plio-Pleistocene (4 median valves, 4 posterior valves, WAM 73.632, 76.1728, 76.1826, 77.3915, 77.3919, 78.428, 78.2618); Cement Works Bore, 32.5 m, Jandakot, (Jandakot beds), Plio-Pleistocene (1 posterior valve, WAM 73.632).

### Species description

Medium chiton to 40 mm (Fig. 4A). Carinated, medium elevation (Fig. 5E); tegmentum about 65% of articulamentum. Tegmentum with numerous random aesthetes all over except for edges of ridges and pustules (Fig. 4D). Tegmentum colour grayish white with irregular zigzag pattern of brown and grayish green, pattern very pale on some specimens; jugum grayish white to grayish yellow, occasionally with brownish bands, bordered either side by band of alternating white, brown and some grayish green; beak of 5th valve deep green. Articulamentum white. Slit formula 5/1/5-7. Girdle colour grayish white with bands and patches of deep green to grayish green; sutural tufts white.

Anterior valve (Fig. 5C) with 5 very weak radial ribs; sculpture of irregular, mainly "U"-shaped pustules, small near apex becoming much larger toward girdle, arranged in slanting rows between ribs. Slits 5, 1/3 width of insertion plate, in grooves to edge of tegmentum. Median valves (Fig. 5B) with narrow, strongly toothed jugum, smooth with very weak longitudinal ridges which appear stronger due to alternating bands of translucent and opaque material, strongly beaked; lateral areas with irregular, mainly "U"-shaped pustules, arranged in diagonal rows on posterior part of lateral areas, in anterior part, pustules in the rows become fused into pustulose ridges, which then become smooth ridges on pleural areas; lateral and pleural areas sometimes divided by a low rib. Slit 1, long, 1/3 to 1/2 width of insertion plate, in groove to edge of tegmentum. Posterior valve (Figs 5A, 5D) with tegmentum longer than wide; jugum like median valves, about 1/4 width of tegmentum; antemucronal area with smooth ridges anteriorly becoming pustulose, then breaking up into rows of "U"-shaped pustules, pustules irregular towards girdle, the rows becoming irregular then disappearing into random pustules on postmucronal area; mucro smooth, in posterior 1/4 of tegmentum;



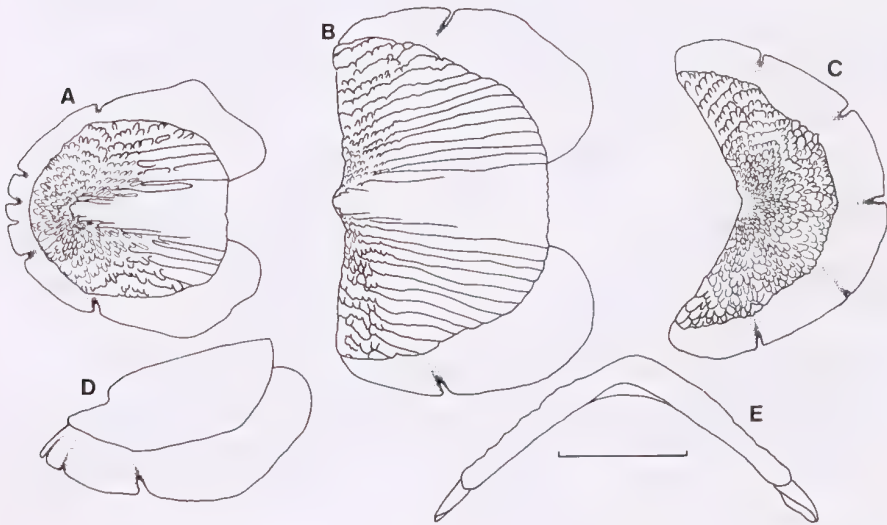
**Figure 4.** *Bassethullia matthewsi*. A. whole specimen, x 5 (SAM D18416); B. detail of girdle showing sutural tuft, x 27 (SAM D18416); C. radula, scale bar = 20 µm (SAM D17604); D. detail of tegmentum showing aesthetes, scale bar = 20 µm (SAM D17604).

postmucronal area concave, not steep. Slits 5-7, long,  $1/3$  to  $1/2$  width of insertion plate, in grooves to edge of tegmentum.

Girdle (Fig. 4B) with numerous microscopic ( $70-100\ \mu\text{m}$  long), slightly curved, tapering, sharp tipped, clear spicules. Sutural tufts with very numerous long ( $580-700\ \mu\text{m}$  long), fine ( $20\ \mu\text{m}$  wide), straight, tapering, sharp tipped, clear spicules.

Gills numerous, merobranchial, abanal, 21-24 ctenidia on each side, tapering large to small anteriorly.

Radula (Fig. 4C) with small, elongate, rectangular, concave central teeth, apical edge of head straight; first lateral teeth narrow basally, with broad, low heads almost as wide as central teeth are long, apical edge of head thickened; major lateral teeth narrower basally, with wider tricuspidate heads, central cusp longest.



**Figure 5.** *Bassethullia matthewsi* (SAM D17604). A. posterior valve; B. median valve; C. anterior valve; D. posterior valve (lateral profile); E. median valve (posterior profile); scale bar = 2 mm.

### Habitat

Singly on pebbles, cobbles and rock in fine to coarse sands; rarely free-living in coarse to very coarse sands; in sand pockets on reefs in medium to high energy areas. Intertidal to at least 15 m depth.

### Distribution

Central Victoria to southern Western Australia, excluding Tasmania. Late Pliocene to Recent.

### Remarks

The confusion between this species and *B. porcina* will be detailed under that species. Iredale and Hull (1925) separated *Glyptelasma matthewsi occidentalis* from King George Sound, southern Western Australia as a subspecies

distinguished from the nominate form by "the more crowded linear sculpture of the median valves and their notably more slanting direction: the pustulose area is restricted to the central portion of the pleural areas" and that the jugal area was broader with more lines. Ashby (1928) regarded *occidentalis* as within the range of variation of *matthewsi*, noting there was great variation between South Australian specimens which encompassed the *occidentalis* form, but the subspecies was still recognised as distinct by Cotton and Godfrey (1940b), Cotton (1964) and Kaas and Van Belle (1980). After examining a large series of specimens, and comparing the holotypes of both forms, I am convinced there is no justification in recognising the western subspecies. I agree with Ashby (1928) that *G. matthewsi occidentalis* falls within the acceptable variation of *Bassethullia matthewsi*, and cannot be considered a separate subspecies.

One factor which has contributed to the confusion on the form of this species is Iredale and Hull's (1925) neotype (AM C155656) of *B. matthewsi*, which is in fact a specimen of *B. porcina*. Both this neotype, and Cotton and Godfrey's (1940a) neotype (SAM D13741), of *B. matthewsi* are invalid (Zeidler and Gowlett 1986), as the holotype (ANSP 64916) is still in existence. A number of specimens of this species were collected from the gut of a whiting (*Sillaginodes punctatus*) (MV F52973, AM C10411, NMNZ MF.16852) by E.H. Matthews (Torr 1912).

### *Bassethullia porcina* (Ashby, 1919)

Figs 6, 7.

*Acanthochiton (Notoplax) porcina* Ashby, 1919, p. 395, pl. 41, figs 7-10.

*Notoplax porcina* (Ashby): Ashby, 1920, p. 290.

*Acanthochiton porcina* Ashby: Ashby, 1924, pp. 383, 385, 390.

*Glyptelasma matthewsi matthewsi* (Bednall & Pilsbry): Iredale & Hull, 1925, p. 95; Iredale & Hull, 1927, p. 84 (in part non Bednall & Pilsbry).

*Bassethullia matthewsi* (Bednall & Pilsbry): Cotton & Godfrey, 1940a, p. 536, fig. 535; Cotton & Godfrey, 1940b, p. 25; Cotton, 1964, p. 80, fig. 89 (in part non Bednall & Pilsbry).

*Bassethullia porcina* (Ashby): Cotton, 1953, p. 23.

*Notoplax (Bassethullia) matthewsi* (Bednall & Pilsbry): Kaas & Van Belle, 1980, p. 103 (in part non Bednall & Pilsbry); Zeidler & Gowlett, 1986, p. 100 (non Bednall & Pilsbry).

#### Material examined

Type: Holotype (SAM D12250) dredged in Gulf St Vincent, South Australia, collected by J.C. Verco.

Extant material: South Australia: Robe (1, MV F57627); Cape Jaffa (4, SAM D17584, D18448); Vivonne Bay, Kangaroo Island (1, SAM D18449); Ochre Point, Gulf St Vincent (2, SAM D17585); Yorke Peninsula (1, AM C155656); Troubridge Point, Yorke Peninsula (2, SAM D18450); Port Moorowie, Yorke Peninsula (6, SAM D17607, D17951, D18404, D18443).

#### Species description

Large chiton to 80 mm (Fig. 6A). Carinated, medium elevation (Fig. 7E); tegmentum about 60% of articulamentum. Tegmentum with numerous random

aesthetes all over except for edges of ridges (Fig. 6D). Tegmentum colour pale yellow with patches of white and grayish orange to grayish red, usually forming streaks; jugum white, sometimes with grayish red bands; beak of 5th valve darker. Articulamentum white. Slit formula 5/1/4-6. Girdle colour pale yellow to grayish yellow or grayish orange, sometimes with spots and streaks of golden yellow. Sutural tufts white.

Anterior (Fig. 7C) valve with 5 very weak radial ribs; sculpture of sharp, concentric to longitudinal, irregular ridges. Slits 5, 1/5 width of insertion plate, in short grooves up to 1/2 width of insertion plate. Median (Fig. 7B) valves with narrow jugum sculptured with shallow longitudinal grooves, beaked, jugum weakly toothed posteriorly; lateropleural areas with sharp longitudinal ridges, becoming irregular towards girdle and on lateral areas, sometimes with very weak diagonal rib. Slit 1, long, 1/3 to 1/2 width of insertion plate, in groove to edge of tegmentum. Posterior valve (Figs 7A, 7D) with tegmentum up to 1.5 times as long as wide; jugum and antemucronal area like median valves; mucro smooth, in posterior 1/4 of tegmentum; postmucronal area concave, not steep, ridges from antemucronal area becoming irregular and broken up into irregular pustules. Slits 4-6, mostly long, 1/4 to 1/2 width of insertion plate, in short, deep grooves up to 2/3 width of insertion plate.

Girdle (Fig. 6B) with numerous microscopic (100-150  $\mu\text{m}$  long), tapering, sharp tipped, white to clear spicules. Sutural tufts with very numerous fine, tapering, sharp tipped, clear spicules, to 1.2 mm long.

Gills numerous, merobranchial, abanal, 25-28 ctenidia on each side, tapering large to small anteriorly.

Radula (Fig. 6C) with small, narrow, elongate, rectangular, concave central teeth, apical edge of head concave in outline; first lateral teeth narrow basally, with very broad, low heads, as wide as central teeth are long, and slightly folded over them, apical edge of head thickened; major lateral teeth narrower basally, with wide tricuspidate heads, central cusp longest.

### Habitat

On smooth rock under clean fine to medium sand, sometimes free-living in loose, clean fine to medium sand; in sand pockets on reefs in medium to high energy areas. From 3 m to at least 15 m depth.

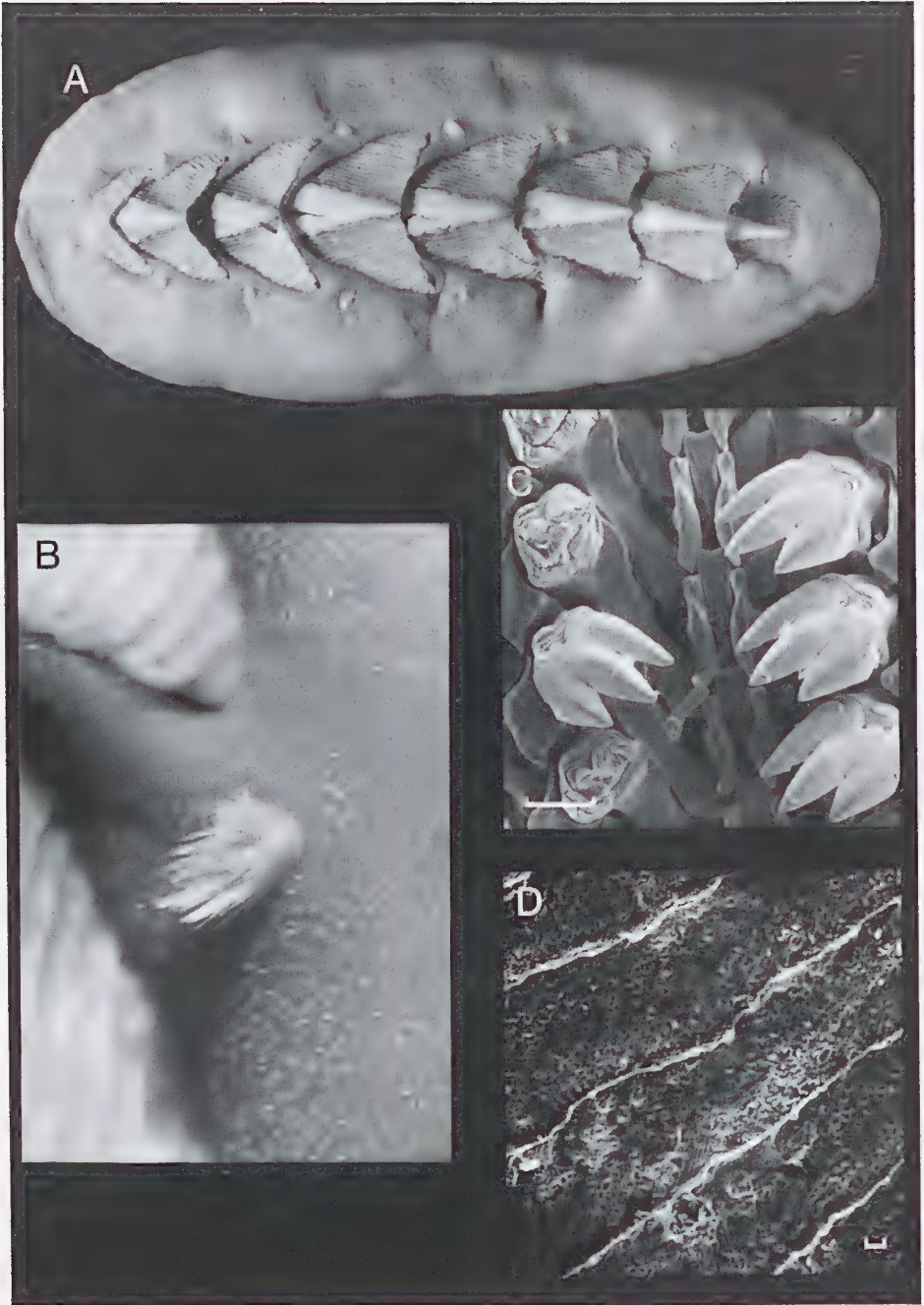
### Distribution

Robe to Investigator Strait, including Kangaroo Island, South Australia. No fossil records are known.

### Remarks

This species has been placed in synonymy with *B. matthewsi* by various authors (Iredale and Hull 1925, 1927; Cotton and Godfrey 1940a, 1940b; Cotton 1964; Kaas and Van Belle 1980; Zeidler and Gowlett 1986). The confusion between the two has arisen because of the few specimens of *B. porcina* available for study.

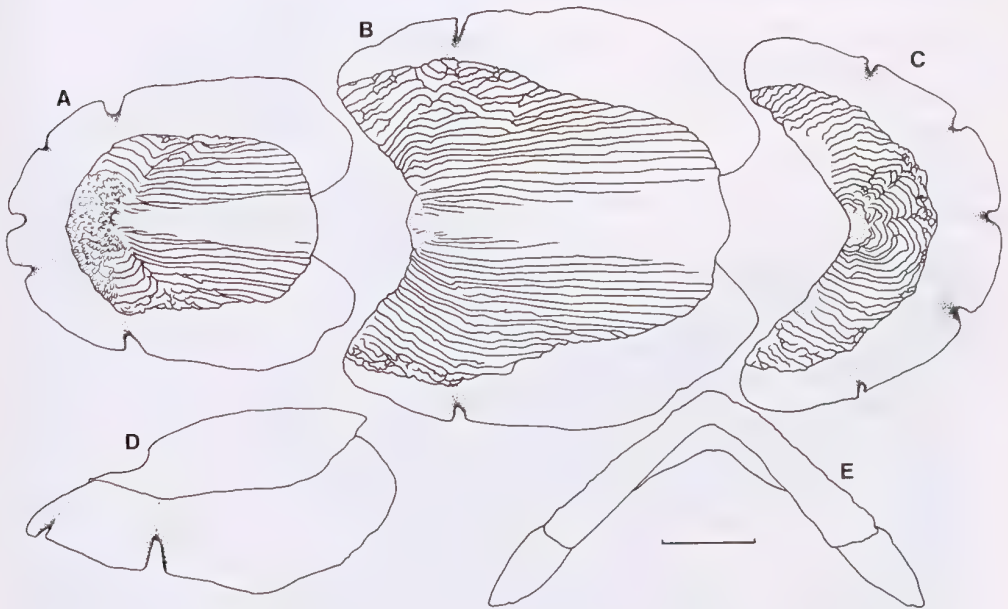
The two species were first synonymised by Iredale and Hull (1925) based on the original descriptions, a few specimens from Victoria and South Australia, and the type of *B. porcina*. Later authors followed Iredale and Hull (1925) in synonymising



**Figure 6.** *Bassethullia porcina* (SAM D17585). A. whole specimen, x 3; B. detail of girdle showing sutural tuft, x 23; C. radula, scale bar = 100 µm; D. detail of tegmentum showing aesthetes, scale bar = 20 µm.

the two species. Cotton and Godfrey (1940a) and Cotton (1964) suggested that *porcina* may be an extra-large deep water form of *matthewsi*, although Cotton (1953) recognised *porcina* as a distinct species.

Bednall and Pilsbry's original description (Pilsbry 1894a) and figures (Pilsbry 1984b) of *matthewsi* clearly show the pustulose lateral areas of the median valve and describe the zigzag brown to green colour pattern. Ashby's (1919) original description and figures of *porcina* show the lack of pustules on the median valve and describe the orange-red streaked and mottled colour pattern. Iredale and Hull (1925, 1927) considered the pustules on the lateral areas of the median valves to be a variable feature, regarding them as obsolete in the *porcina* form. This may be why Iredale and Hull (1925) selected a specimen of *porcina* (AM C155656) as their neotype of *B. matthewsi*. Fortunately, this neotype is invalid as the holotype of *B. matthewsi* (ANSP 64916) is still in existence. Iredale and Hull (1925, 1927) apparently ignored the quite different colour patterns and valve shapes of these two species.



**Figure 7.** *Bassethullia porcina* (SAM D17585). A. posterior valve; B. median valve; C. anterior valve; D. posterior valve (lateral profile); E. median valve (posterior profile); scale bar = 2 mm.

Recently, a number of specimens referable to *B. porcina* have been collected in South Australia. Using a series of specimens, and comparing types of both species, there are a number of very distinct differences between the two species, summarized in Table 1. These character differences are constant over the geographical ranges of

both species, and are supported by differing habitat requirements: *B. porcina* prefers finer sand and larger rock substrate than *B. matthewsi* (pers. obs.).

*B. porcina* currently has a very limited known distribution. This is mainly due to its habitat only being readily accessible to divers, and that this habitat is almost never examined for chitons by most collectors.

**Table 1.** Distinguishing characters of *Bassethullia matthewsi* and *B. porcina*.

Character	<i>B. matthewsi</i>	<i>B. porcina</i>
Specimen length	to 40 mm	to 80 mm
Tegmentum colour	gray-white with brown, green zigzag pattern	pale yellow-white with orange, red streaks
Anterior valve sculpture	irregular "U"-shaped pustules	concentric-longitudinal irregular ridges
Median valve sculpture	pustules and grooves and ridges	grooves and ridges only
Girdle colour	gray-white with green bands and patches	yellow with streaks and spots of golden yellow
Habitat		
1. Substrate	pebbles, cobbles, rock	rock
2. Sediment	fine to coarse sand	fine to medium sand

***Bassethullia propeporcina* sp. nov.**

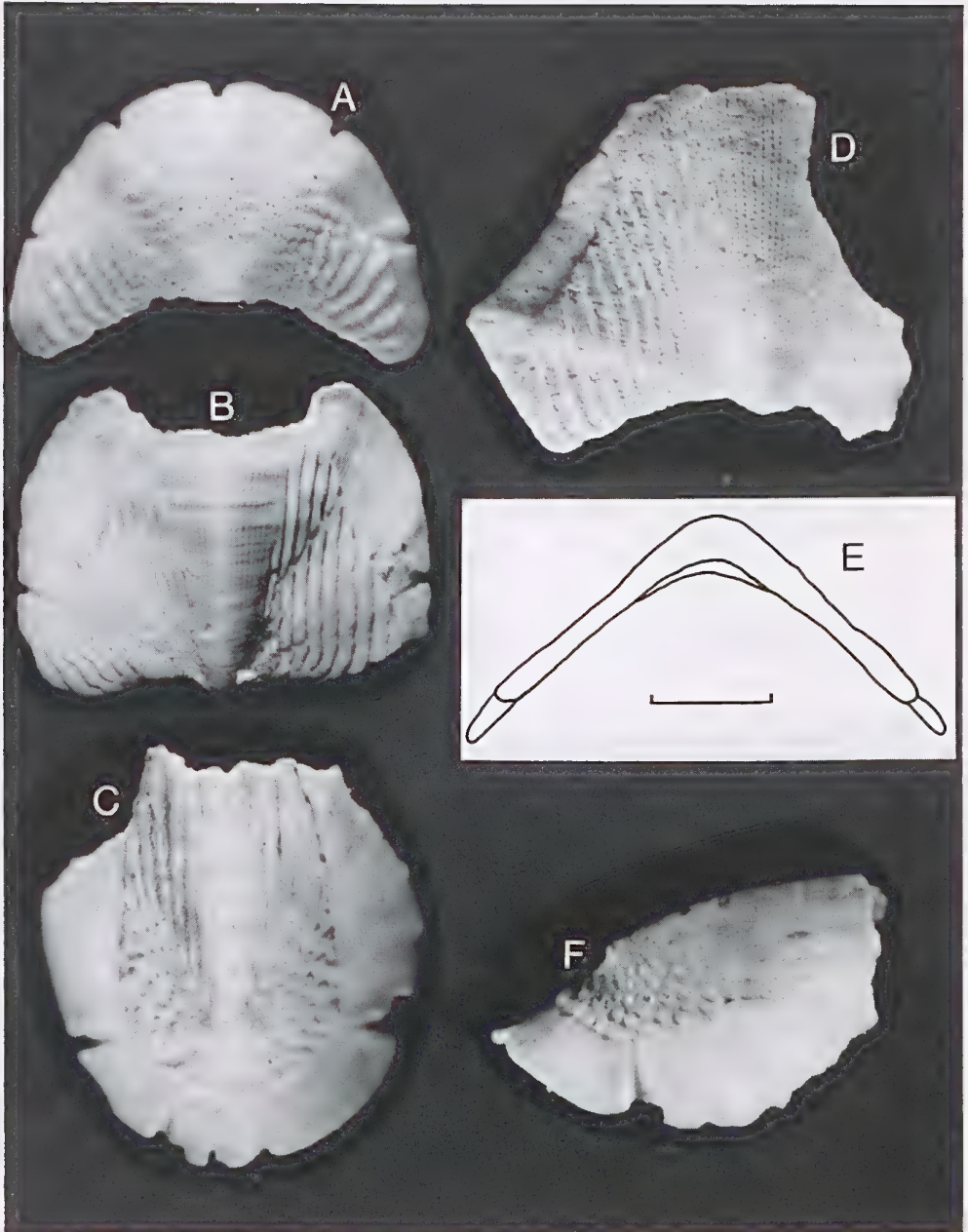
Fig. 8.

Holotype: WAM 78.430, one incomplete posterior valve, anterior tegmentum damaged, sutural lamina mostly missing, insertion plate chipped, 2.85 x 2.55 mm, collected from 33.4 m, Paulik's Bore, E. end of lot 41, Semple Road, Jandakot, Western Australia, (32°06.91'S, 115°50.46'E), collected by J.G. Hastings and G.W. Kendrick, 7.vi.1968, (Jandakot beds), Plio-Pleistocene.

Paratypes: WAM 78.1942, one slightly worn anterior valve, slight chips on insertion plate, 1.8 x 2.75 mm, collected from 30.5 m, same bore, stratigraphic data and collectors as holotype, 6.vi.1968; WAM 88.343, one worn, incomplete median valve, just over half of valve present, sutural lamina missing, remaining insertion plate worn and broken, 5.05 x 4.1 mm, same collection data as holotype; WAM 86.1194, one median valve, slight chips to sutural lamina and insertion plates, 3.0 x 3.75 mm, collected from 28.6-40.4 m, Jupp's Bore No. 1, Swan Loc. 789, Gingin Brook Road, West Gingin, Western Australia, (31°19.50'S, 115°48.92'E), collected by G.W. Kendrick, 31.i.1986, shell sand, Ascot Formation, Pliocene.

Other fossil material: Western Australia: Paulik's Bore, 37.8-37.9 m, Jandakot, (Jandakot beds), Plio-Pleistocene (1 median valve, WAM 76.634); Rando's No. 2 Bore, 16.1 m, Thornlie, Ascot Formation, Pliocene (1 median valve, WAM 77.3027).





**Figure 8.** *Bassethullia propeporcina* sp. nov. A. paratype, anterior valve, x 22 (WAM 78.1942); B. paratype, median valve, x 15.5 (WAM 86.1194); C. holotype, posterior valve, x 21 (WAM 78.430); D. paratype, median valve, x 16 (WAM 88.343); E. paratype, median valve (posterior profile), scale bar = 1 mm (WAM 86.1194); F. holotype, posterior valve, lateral view, x 21 (WAM 78.430).

### Species description

Small to medium chitons. Carinated, medium elevation (Fig. 8E); tegmentum about 65% of articulamentum. Slit formula 5/1/5. Girdle unknown.

Anterior valve (Fig. 8A) without radial ribs, sculpture of irregular, mainly "U"-shaped pustules, coalescing, becoming pustulose longitudinal to concentric ridges towards edge of tegmentum. Slits 5, about 1/4 width of insertion plate, in grooves to edge of tegmentum. Median valves (Fig. 8B, 8D) with jugum smooth, about 1/3 width of tegmentum, strongly beaked; lateropleural areas with longitudinal ridges, pustulose close to beak, irregular on lateral areas, becoming smooth ridges on pleural areas. Slit 1, short, about 1/5 width of insertion plate, in groove to edge of tegmentum. Posterior valve (Figs 8C, 8F) with tegmentum twice as long as wide; jugum smooth, about 1/3 width of tegmentum; antemucronal area with smooth, longitudinal ridges becoming pustulose then breaking up into rows of "U" shaped pustules, rows then becoming irregular then disappearing into random pustules on postmucronal area; mucro smooth, in posterior 1/4 of tegmentum; postmucronal area concave, not steep, angle of postmucronal area continued onto insertion plate. Slits 5, irregular, about 1/4 width of insertion plate, in grooves to edge of tegmentum.

### Etymology

A combination of the Latin "prope" meaning nearly, almost, with "porcina", in recognition of the close resemblance of this species to the extant species *B. porcina* (Ashby, 1919).

### Distribution

Southern Western Australia. Pliocene to Pleistocene.

### Remarks

*B. propeporcina* was compared with other fossil and extant species in the genus *Bassethullia*. It most closely resembles the extant species *B. porcina*, but can be readily distinguished from it by the relatively much narrower posterior valve and the more pustulose sculpture on all valves. It can be distinguished from other fossil and extant members of the genus by the form of the sculpture of the lateral areas.

The non-type material referred to this species (WAM 76.634, 77.3027) is broken and worn.

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